

REMARKS

This amendment is responsive to the Office Action of December 23, 2008. Reconsideration and allowance of claims 1-9 and 11-20 are requested.

The Office Action

Claims 1-14 stand rejected under 35 U.S.C. § 103 over Argiro (US 5,986,662) in view of Kaufman (US2004/0125103).

Claims 13 and 14 further stand rejected under 35 U.S.C. § 101.

35 U.S.C. § 101

Claims 13 and 14 have been amended to address the 35 U.S.C. § 101 issues. With these amendments, it is submitted that claims 13 and 14 now comply fully with the requirements of 35 U.S.C. § 101.

Argiro and Kaufman Are Not Properly Combined

Argiro at column 3, lines 1-8 describes the cast rays as projecting perpendicular from each pixel in the picture claim, i.e., the rays extend parallel to each other. When the rays extend parallel to each other, the scale of the 2D image is substantially the same as the scale of the 3D image.

By contrast, Kaufman projects the rays along diverging paths to generate a view frustrum 168 [0253]. These diverging rays result in minification. That is, as the rays go deeper and deeper into the 3D volume, they diverge further and further per Figure 24 of Kaufman. These divergent rays result in minification in which the resultant 2D image has a scale which is much smaller than that of the volume image.

Although neither Kaufman nor Argiro address converging rays, converging rays result in magnification of the 2D image relative to the scale of the 3D volume.

The Examiner is applying the portions of Kaufman dealing with Kaufman's solution to the problem of diverging rays. However, because Argiro has parallel rays, Argiro does not have the problem addressed by Kaufman. Because

Kaufman corrects a problem which Argiro does not have, it is submitted that there would be no motivation to add the divergent ray correction of Kaufman to a parallel ray technique of Argiro.

**Claims 1-5, 7-9, 11, and 12 Distinguish
Patentably Over the References of Record**

Argiro is representative of the acknowledged prior art discussed in the Background portion of this application and suffers from the numerous problems described in the present application. Claim 1 has now been amended to emphasize and clarify the differences relative to Argiro and the other prior art references which contribute to solving these problems in Argiro and the other prior art references.

Claim 1 calls for selecting one of a plurality of rendering algorithms or parameters dependent on the ray position. Ray position as used in claim 1 connotes the positions along a given ray at which calculations to determine a contribution to the 2D image pixel value are made. The Examiner directs the Applicant to Argiro, column 2, line 63 - column 3, line 8. This section of Argiro makes no suggestion of changing the algorithm with ray position. Rather, this section of Argiro merely suggests that at each ray position, a further calculation is made to determine a further contribution to the corresponding pixel of the 2D image. There is no suggestion that the rendering algorithm or parameter used to generate this contribution changes with ray position. To the contrary, as set forth in the Detailed Description portion of Argiro, the operator can select various rendering algorithms or parameters such as the viewing angle, degree of transparency, zooming, color, and the like. However, whatever algorithm/parameter is selected by the user of Argiro, that algorithm remains constant through all ray positions along each ray. Accordingly, it is submitted that Argiro does not disclose this concept. Kaufman was not cited as curing this shortcoming of Argiro and, indeed does not do so. Rather, Kaufman was cited for its description of casting a ray from a viewpoint, which has now been eliminated from claim 1.

Accordingly, it is submitted that claim 1 distinguishes patentably and unobviously over the references of record.

Claim 6 Distinguishes
Patentably Over the References of Record

Claim 6 has been placed in independent form including the subject matter of its parent claims.

Contrary to the Examiner's assertion, it is submitted that Argiro does not disclose jumping forward or backward along a ray to a particular ray position and resuming processing from that position. This jump ahead/backward feature is significant in conjunction with Figures 7A-7C of the present application and the Description starting on page 8, line 4 of the present application in order to remove the artifact or defect 340 (Figure 3B) of an air/water interface in the colon. Based on information determined as the algorithm steps along the ray positions, it is advantageous to go back several steps or ray positions, change algorithms, and recalculate in order to remove the air/water interface artifact.

Column 3, lines 1-8 of Argiro does not disclose jumping forward or backward and resuming processing at that position. Rather, this section of Argiro merely describes the conventional aspect of the ray casting technique in which the processor steps from ray position to ray position or voxel to voxel and calculates the contribution at that position/voxel to the corresponding pixel value of the 2D image. Such routine stepping along the ray does not disclose or fairly suggest jumping forward or backward. Indeed, in the Argiro scheme of things, jumping backward would cause a section of the ray to make a double contribution to the pixel value and jumping forward would cause some voxels not to contribute. While the present application recognizes that there may be some advantages to this, Argiro does not. Rather, this section of Argiro merely describes stepping in regular steps/voxels along the ray without jumping forward or backward.

Further, claim 6 calls for determining a rendering algorithm and/or rendering parameters independent on the ray position. Again, Argiro makes no suggestion of determining which of a plurality of rendering algorithms or rendering parameters should be applied independent on ray position along the ray being processed.

Further, as set forth originally in claim 5, claim 6 now calls for the processing action performed at each of the ray positions to be dependent on processing results of a ray position along the ray that has already been processed.

Column 3, lines 1-8 of Argiro, referenced by the Examiner, it is submitted, describe performing the same process at every step/voxel and make no suggestion of changing the process based on previously processed results along the ray.

For these and numerous other differences, it is submitted that claim 6 distinguishes patentably over the references of record.

Claim 13 is Now in Condition for Allowance

Claim 13 has been amended to claim a computer readable medium carrying a computer program. Accordingly, it is submitted that claim 13 now complies fully with the requirements of 35 U.S.C. § 101 by virtue of being directed to an article of manufacture.

Claim 13 calls for selecting a subset of a available rendering algorithms/parameters which are available for selection. Claim 13 further calls for, while stepping along the ray through a plurality of ray positions, selecting one of the subset of rendering algorithms/parameters to be implemented dependent on ray position. By contrast, it is submitted that Argiro uses the same rendering algorithm/parameter throughout the generation of a 2D image and has no ray position dependent selection of the algorithm/parameter.

Claim 13 further calls for a plurality of different rendering algorithms/parameters to be used to generate the pixel values of the 2D image. By contrast, it is submitted that Argiro consistently uses the same algorithm/parameter throughout a given 2D image.

Kaufman was cited for its showing of a viewpoint, which limitation has been eliminated from claim 13.

Accordingly, it is submitted that claim 13 distinguishes patentably over the references of record.

Claims 14-20 are Now in Condition for Allowance

Claim 14 has been amended to clarify that the rendering algorithm/parameter is selected dependent on ray position which, as discussed above, is not shown by the references of record.

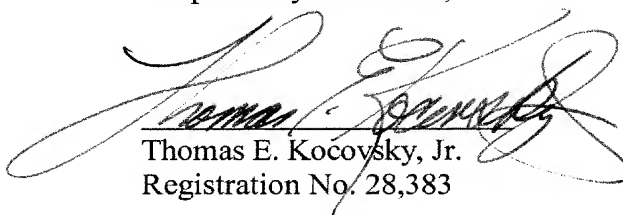
New claims 15-20 represent subject matter from the system claim set in method format. Claims 15-18 are based on the processing actions previously listed in claim 6. The processing actions of claims 16-18 have been previously addressed by the Examiner. Claim 19 addresses the 3D model originally presented in claim 3 but in an expanded, more precise format. Claim 20 is based on subject matter previously presented in claim 5.

Accordingly, it is submitted that claim 14 and claims 15-20 dependent therefrom distinguish patentably and unobviously over the references of record.

CONCLUSION

For the reasons set forth above, it is submitted that claims 1-9 and 11-20 comply with the statutory requirements and distinguish patentably over the references of record. An early allowance of all claims is requested.

Respectfully submitted,



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